



Pacific Island Network

Science Communications Strategies and Plan

Five Year Plan (2009–2014)

Natural Resources Report NPS/PACN/NRR—2009/102





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Five Year Plan (2009–2014)

Natural Resources Report NPS/PACN/NRR—2009/102

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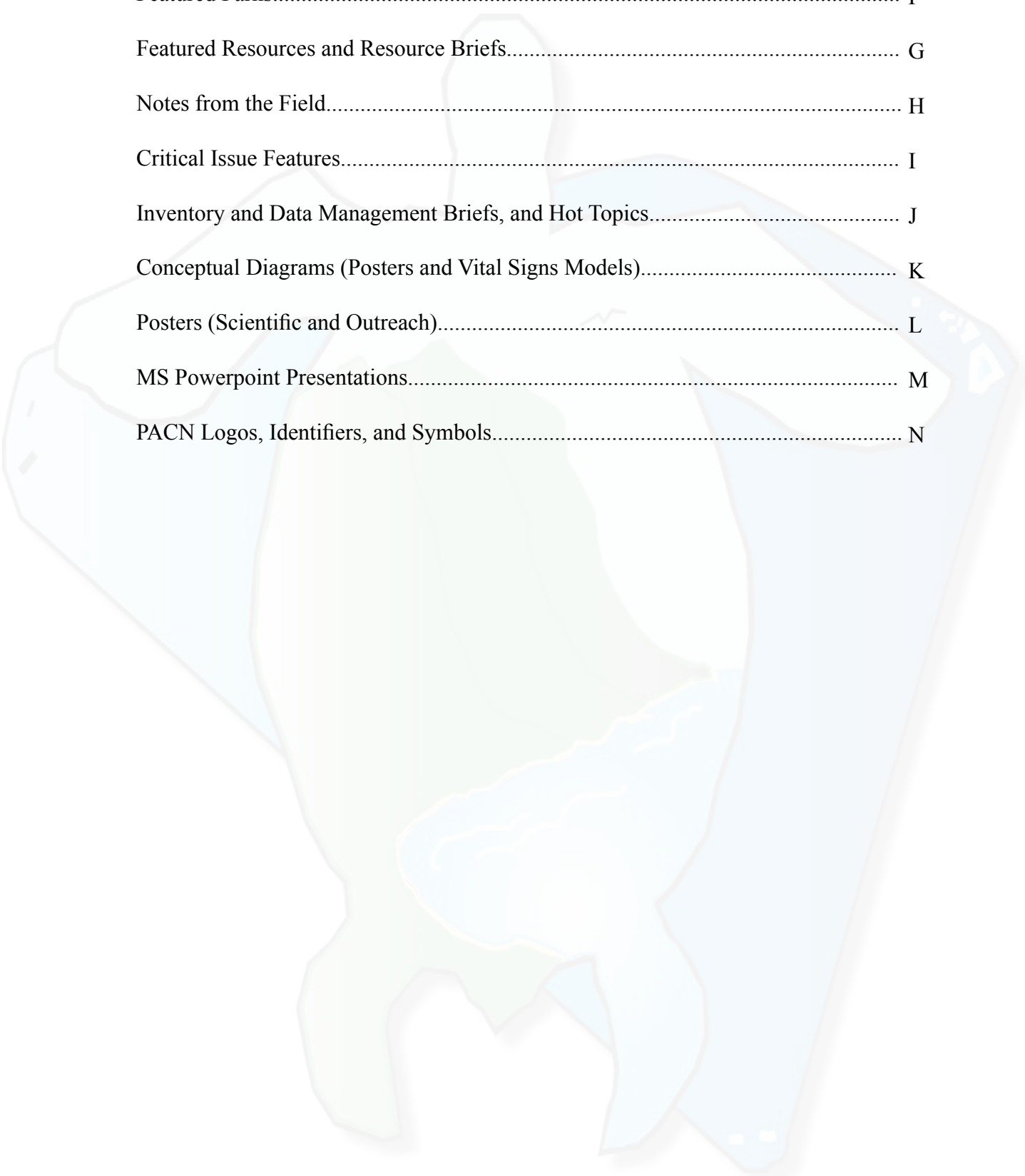
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Pacific Island Network Science Communications Overview

The Pacific Island Network (PACN) of the National Park Service (NPS) places science communications as a high priority within its Vital Signs monitoring program. Pursuant to the collection of scientific information through monitoring, a critical task is to develop a multi-faceted strategy that effectively communicates the status and trends of natural resources to key stakeholders. This science communications plan outlines the strategy and products to be developed over the next five years to effectively disseminate scientific information to broad audiences. The Inventory and Monitoring Program (I&M) science communications plan must inform park managers and staff, the scientific community, and the public of the health of selected natural resources in PACN park units (i.e., Vital Signs).

Science Communications Goal and Objectives

The overall goal and objectives of science communications in the Pacific Island Network are simple, yet embrace a diverse and collaborative approach.

Goal

Effectively communicate natural resources inventory and monitoring results to all network park stakeholders (NPS staff, the scientific community, and the public) through diverse mechanisms focusing on scientifically-based information. This will be achieved through communication tools that highlight resource trends and successful examples of adaptive management in PACN parks. Science communications achieves this through developing products that are driven by a strong connection to credible scientific monitoring data.



National Park Service guidance states that a primary responsibility of I&M communications is to provide a clearinghouse for resource condition and trend information. The core network function is to monitor Vital Signs (indicators of ecosystem health) as established in the PACN Monitoring Plan. Therefore, science communications focuses on: (a) communicating data and information to park managers, planners, and park staff to assist decision-making, education, and research; (b) synthesizing key findings in a succinct manner for managers and planners; (c) developing resource briefs and technical documents for each Vital Sign; and (d) preparing data synthesis reports on Vital Signs. Other responsibilities include providing outreach materials to NPS interpreters, educators, and the general public. Education and outreach are essential components of any successful monitoring program. Scientists and staff are responsible for effectively communicating scientific results in understandable formats to managers and other stakeholders (Foley 2008).

To achieve this goal, the PACN has identified six objectives. These objectives are scattered throughout the document to avoid redundancy of science communications methods and products. The objectives below are shown in order of importance.

1. Communicate resource issues and trends to park superintendents and resource managers through scientifically-based communications and tools
2. Utilize science communications methods to convey monitoring results as effective feedback for adaptive management (e.g., Vital Signs trends analyses)
3. Communicate resource issues and trends to NPS staff, scientists, and the public through a diverse, multi-faceted communication strategy that is tailored to the audience (e.g., newsletters, web-applications, presentations, resource briefs)
4. Work closely with network parks to develop science communications tools and outreach strategies that utilize shared resources to create synergism and save on expenditures
5. Build close communications between I&M and parks' staff to facilitate links between cultural and natural resources with Vital Signs monitoring
6. Develop partnerships to leverage funds and better disseminate science communications messages (e.g., invasive species committees)

The Pacific Island Network Monitoring Plan states that the communication and reporting strategy will incorporate a diverse approach to reach multiple audiences. This communication strategy will document long-term monitoring results and provide feedback toward improvement of the monitoring program in the NPS to assure accountability of the program, adequate program review, and program application to multiple audiences. The PACN Monitoring Plan describes the seven reporting categories found in Figure 1 (HaySmith et al. 2005).

1. Monitoring protocol and project reports
2. Status and trends reports
3. Scientific documents and presentations
4. Management briefings
5. Website communications
6. Interpretation and outreach
7. Program and protocol reviews



Figure 1. The seven reporting categories within the Pacific Island Network Monitoring Plan which will incorporate science communications products and tools for effective communication with Pacific Island Network audiences. A few examples are shown above.

National Inventory and Monitoring Program Overview

Knowing the condition of natural resources in national parks is fundamental to the NPS's ability to manage park resources "unimpaired for the enjoyment of future generations." National park managers across the country are confronted with increasingly complex and challenging issues. These issues require broad-based understanding of the status and trends of park resources as a basis for making decisions (HaySmith et al. 2005). For years, managers and scientists have sought ways to characterize and determine trends in the condition of parks and other protected areas. Assessments of resource trends provides an evaluation of the efficacy of management practices and restoration efforts and provides early warnings of impending threats. A key factor to success is the interaction among research, monitoring, and management (Figure 2). This process assures well-informed management decisions which are grounded firmly in sound science.

Protecting and managing a park's natural resources requires an ecosystem approach because all parks are open ecological systems. These systems face threats such as air and water pollution, and invasive species often originating outside park boundaries. An ecosystem approach is further needed because no single spatial or temporal scale is appropriate for all system components and processes. The appropriate scale for understanding and effectively managing a resource might be at the species, population, community, or landscape level. In some cases, acquiring this information may require a regional, national, or international monitoring effort to understand and manage a resource. National parks are part of larger, inter-connected ecosystems and must be managed in that context.

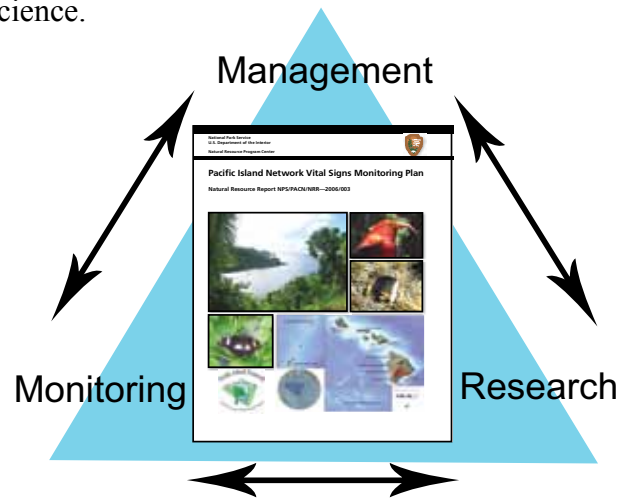


Figure 2. The balance between research, monitoring, and management in the PACN.

The Natural Resource Challenge (NRC) was launched in 2000 to revitalize and expand the natural resource program within the NPS. The NRC was intended to improve park management through greater reliance on scientific knowledge. Vital Signs monitoring is one of the key components of the NRC. Administrative oversight for Vital Signs monitoring within the parks is organized on a network basis.

Pacific Island Network Inventory and Monitoring Program Overview

National parks have been grouped into 32 monitoring networks that are linked by geography and shared natural resource characteristics. Individual parks within each of the networks work with the I&M program by sharing professional staff and funding to plan, design, and implement an integrated long-term monitoring program. The PACN is administered by a board of directors which consists of network park unit superintendents. The Pacific Island Network contains 11 park units spread across the Pacific Ocean between Guam, Saipan, American Samoa, and Hawaii (Figure 3). Monitoring for the PACN includes service-wide goals summarized as:

1. Determine status and trends of selected indicators of park ecosystem conditions to inform management decisions that benefit park resources
2. Provide early warning of abnormal conditions of selected indicators to develop effective mitigation measures
3. Produce data to better understand dynamic conditions of park ecosystems and to employ comparative reference points with other environments
4. Employ data to meet certain mandates related to natural resource protection and visitor enjoyment.
5. Establish a means of measuring progress towards performance goals
6. Provide data to protect and manage resources sharing cultural and natural value (PACN only)

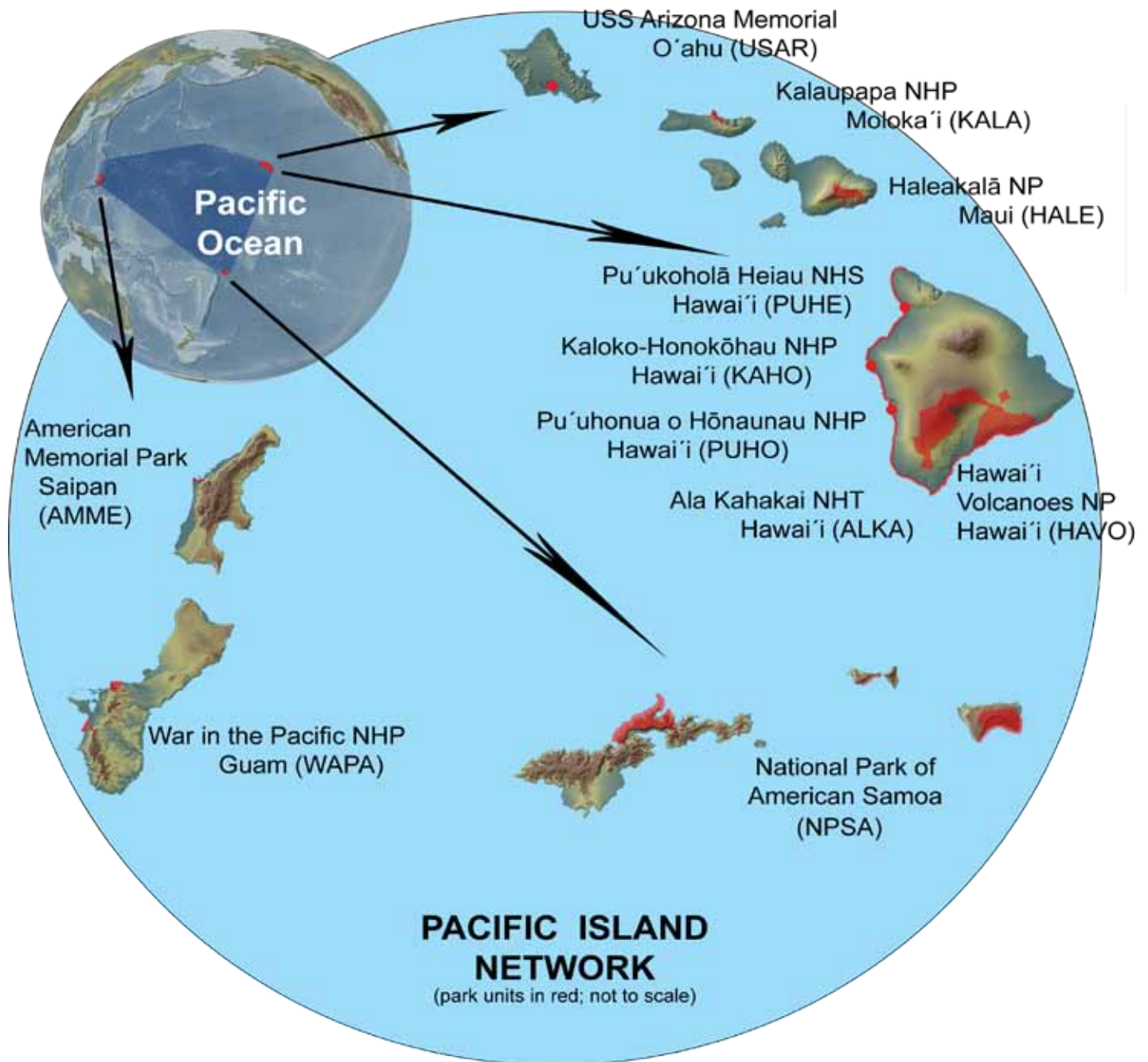


Figure 3. Map of the 11 Pacific Island Network park units.

While PACN parks share many characteristics, the geographically vast network is marked by ecological diversity (Figure 4). Important natural communities include aeolian, alpine, and subalpine ecosystems; wet forests (e.g., rain, cloud, and mesic forests); dry forests and grasslands; subterranean ecosystems; streams; wetlands (e.g., montane bogs, coastal marshes, mangrove swamps, and anchialine pools); and nearshore marine ecosystems (e.g., coral reefs and sea grass beds). The park units also contain a high proportion of the nation's threatened and endangered species, and provide some of the last remaining habitats for these rare plants and animals. Some of the network's most challenging management issues include: invasive species, adjacent land-use, in-park resource use, fire, global climate change, and natural hazards such as lava flows and tropical cyclones (HaySmith et al. 2005).

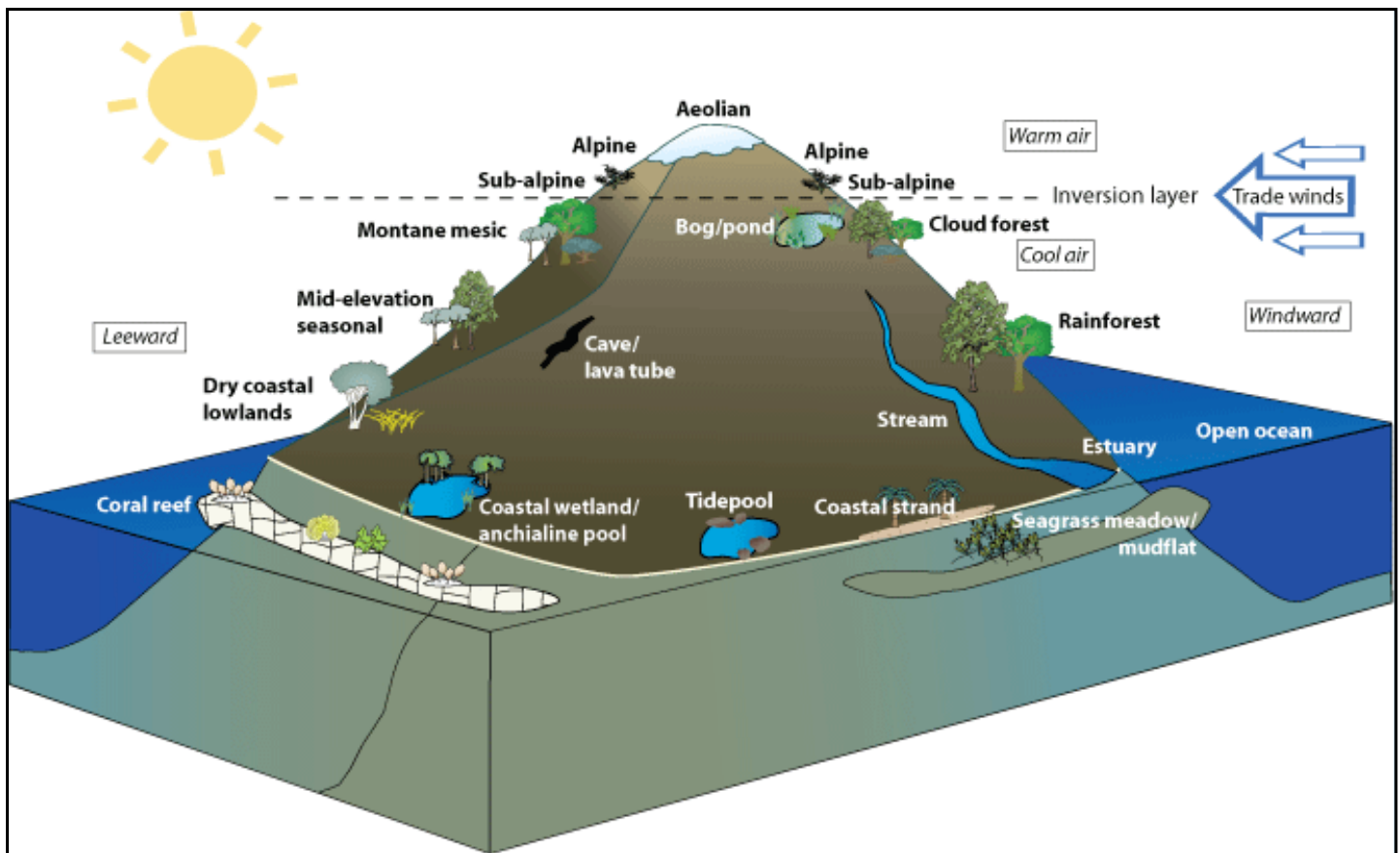


Figure 4. Conceptual diagram demonstrating the diversity of natural communities in the PACN.

Monitoring provides scientific information about the ecological health of our national parks. Vital Signs are a medical analogy for ecosystem health and include: (1) physical, chemical, and biological elements and processes of park ecosystems; (2) known or hypothesized effects of stressors; and/or (3) elements that have important human values. The Vital Signs selected by the Pacific Island Network (Table 1) are a subset of the total suite of natural resources that park managers are directed to preserve. PACN Vital Signs include several broad categories of physical and chemical processes important to all park systems such as air and climate, water, geology, and soils. Because of the high rate of endemism and the pervasive threats of invasive species in network parks, biological integrity is a large component of the PACN Vital Signs list (HaySmith et al. 2005).

Analogous to taking a human pulse to assess physical health, natural resources Vital Signs are monitored to evaluate overall condition or health of ecosystems in national parks.

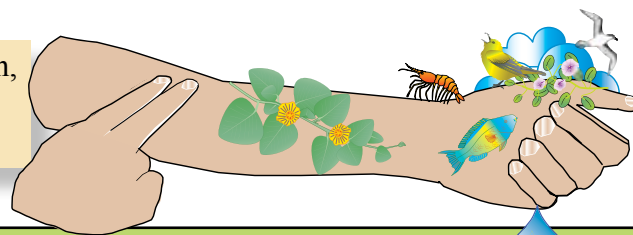


Table 1. Pacific Island Network Vital Signs.

	Vital Sign	H ₂ O
Air and climate	Climate	
	Groundwater dynamics	
Water	Water quality	
	Status and trends of established invasive plant species	
Biological integrity	Early detection of invasive plants	
	Benthic marine community	
	Marine fish	
	Freshwater animal communities (Streams and Anchialine pools)	
	Focal terrestrial plants (Communities and Focal species)	
	Landbirds	
	Seabirds	
	Bats (Frugivorous and Insectivorous)	
	Landscape dynamics	
	Fish harvest	
Landscapes (Ecosystem patterns and processes)		
Human use		

Science Communications and Network Strategies

Science communications is the successful dissemination of scientific knowledge to a wide range of audiences, including scientists, managers, policy-makers, and the public. Because some of these audiences generally do not look for information in scientific journal articles, information must be provided in formats are widely accessible (Thomas et al. 2006). In this sense, while scientific publications are important to disseminate science, they do not necessarily constitute effective science communications. Scientists within universities, private institutions, organizations, and government agencies (e.g., the National Park Service) are often requested to provide scientific data and related information for decision-making. However, data are often not easily discernible for broader audiences as provided in scientific formats. Managers and policy-makers request data from scientists to assist with important management decisions, and the data needs to be in formats that they can readily use. Therefore, it is the PACN's intention to develop appropriate communication tools whereby natural and cultural based scientists can provide information to broader audiences. In this manner, communications should demystify scientific data and data collection processes. It should also help managers make adaptive management decisions (e.g., Figure 5). In summary, only when effective science communication is achieved will the importance of resources monitoring information be realized.

The Role of Vital Signs Monitoring in Adaptive Park Management

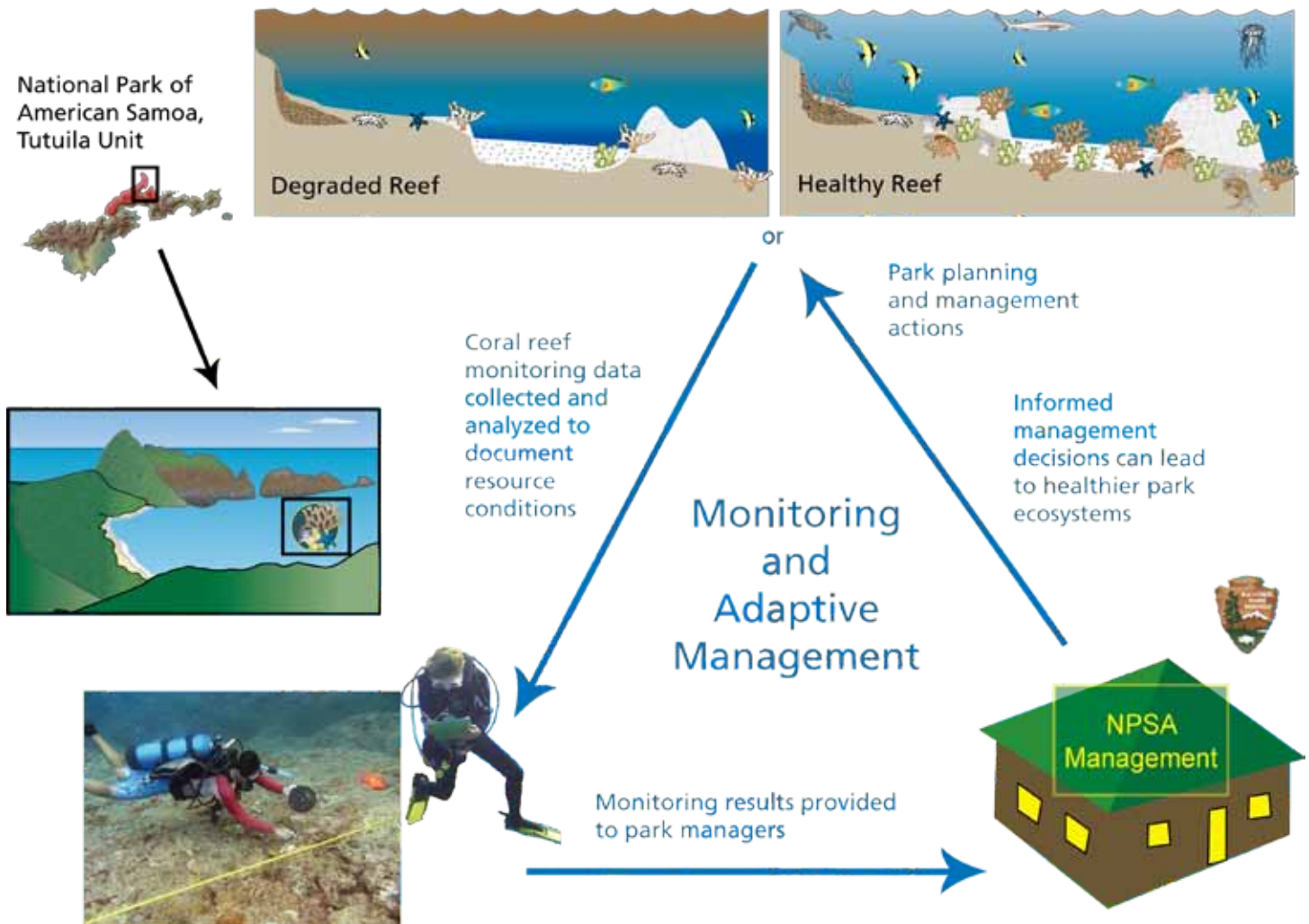


Figure 5. Vital Signs monitoring provides data for natural resources questions to facilitate adaptive management.

Science communications is inherent to the mission of the Inventory and Monitoring program because of the need to effectively communicate monitoring results to park management, stakeholders, and the public. Likewise, interpretation of resources in national parks is incumbent upon Interpretive Divisions because their mission is to inform the public and stakeholders of natural and cultural history, as well as other resource conditions in national parks. While commonalities exist between science communications and interpretation, below are some distinctions that are key to the Inventory and Monitoring program:

Key distinctions between science communications and interpretation:

Objectives:

1. Science communications for the Inventory and Monitoring program conveys scientific status and trends results to park management, key stakeholders, and the public.
2. Interpretation connects diverse audiences, educational, and interest groups to the meanings and values represented in natural, historical, and cultural resources.

Methodologies:

1. Science communications methods for the Inventory and Monitoring program include: trends reports, Vital Signs reporting systems, websites, newsletters, resource briefs, and conceptual diagrams.
2. Interpretation methods include: illustrated ranger talks, resource immersion walks, junior ranger programs, special events, wayside and museum exhibits, movies, and website venues.



While the objectives, audiences, and methods can be quite different for science communications and interpretation, the resources that the two programs communicate about are largely similar. Therefore, it is vital for the two programs to work collaboratively. Science communications within the I&M program can feed status and trends data to park management as well as Interpretation Divisions. The Interpretation Division can then disseminate many of these messages to broader audiences. Working together will increase efficiency of time and resources for park and I&M staff. Various collaborative methods are already being developed and utilized for both science communications and interpretation.

Science Communications Strategy

The Pacific Island Network is developing science communication tools to convey Inventory and Monitoring project results, focal resource issues, and natural resource history to park managers, communities, and visitors. However, along with developing a science communications plan, a strategy is required to focus these efforts for the effective delivery of Inventory and Monitoring information.

Science communications strategic needs include:

1. Work closely with parks on all communications endeavors including cultural values integration with natural resources monitoring
2. Collaborate with interpretation on Vital Signs outreach
3. Augment science communications personnel and expertise
4. Leverage funds and resources to build capacity
5. Target and tailor science communications methods to specific audiences
6. Communicate with the scientific community through journal articles, conferences, and web-based forums
7. Work with partners to develop shared communications with mutual audiences

In addition to understanding PACN science communications needs, it is critical to identify three components of communications: (1) the audience; (2) the message; and (3) the communication methods to be employed. The following figures (Figures 6 and 7) demonstrate these components and provide examples of each. I&M will continually develop messages and methodologies as scientific results are available from monitoring in the field.




<u>Audience</u>	<u>Message (examples)</u>	<u>Methods (examples)</u>
Superintendents Park managers and staff	‘Vital Signs are valuable indicators of ecosystem health and demonstrate resource changes in PACN parks’	 <ul style="list-style-type: none"> • Park meetings • Resource reports • Web tools • Newsletters
Interpretation Maintenance Law enforcement Administration Natural history associations	‘Monitoring Vital Signs of terrestrial and aquatic systems provides data about results of management activities on park resources’	 <ul style="list-style-type: none"> • Outreach events • Web tools • Focus groups
Other agencies and NGOs Adjacent communities Cultural groups Visitors Students Political and media representatives Special interest groups	‘Partnering is key to successful science communications with parks and external partners’ ‘Cultural values and natural resources are linked to monitoring’ ‘Alien plants negatively impact national parks’	

Figure 6. The three components of communications: audience, message, and methods within the Pacific Island Network communications strategy.

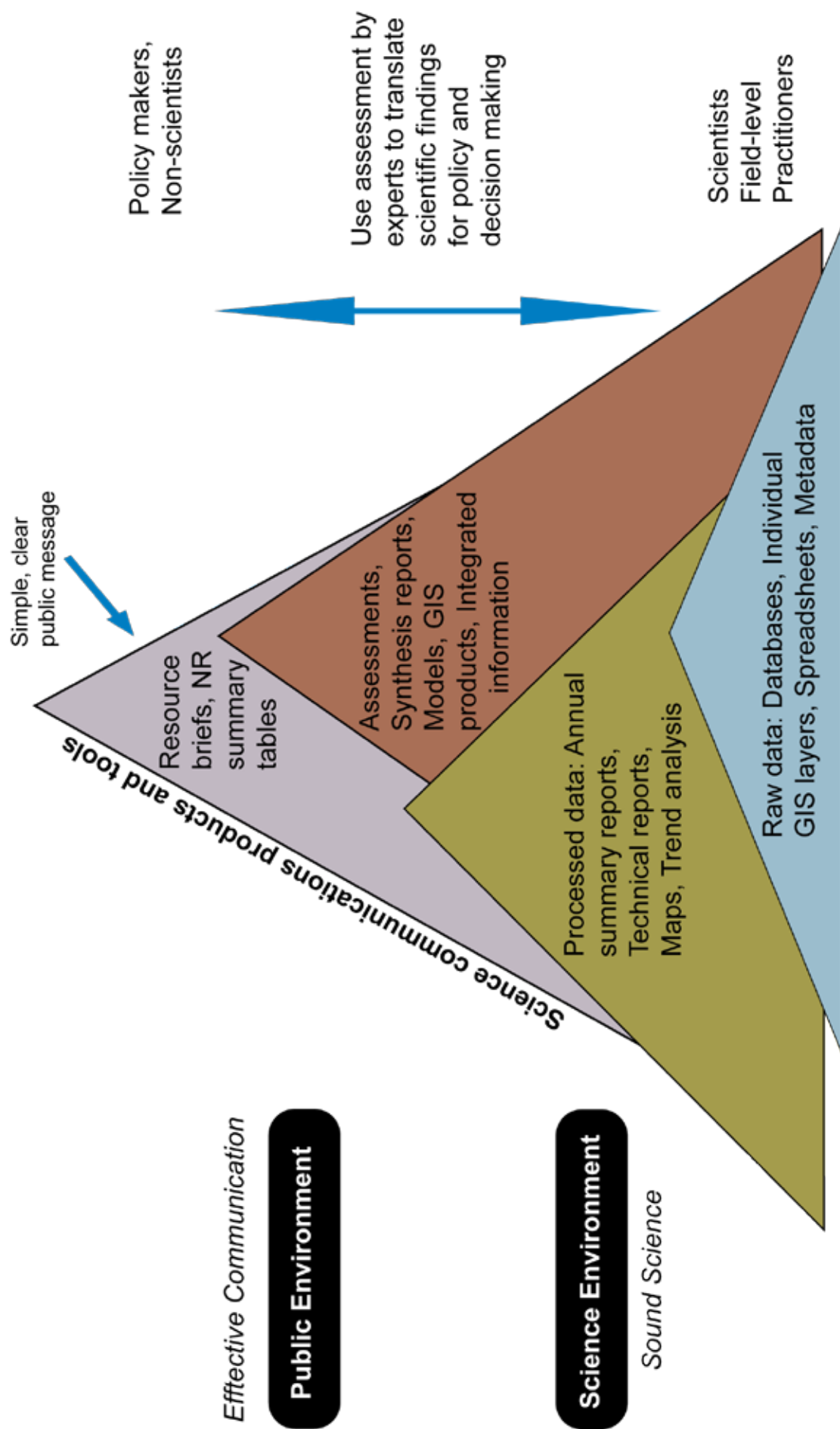


Figure 7. Information pyramids aligning audiences with data needs (adapted from Fancy 2008).

Communication Tools

Science communications products are diverse in subject, scope, and utility. They often combine scientific tables, maps, graphs, conceptual diagrams, and photos to more accurately convey complex results. All science communications products are intended to convey information and data from the I&M program to the targeted audiences in the most useful formats and media. Examples of useful formats are shown below with two different types of outreach media, an Ala Kahakai National Historic Trail poster, and a Water quality monitoring resource brief. These documents demonstrate how different techniques can be employed for purposes such as communicating timelines of resource and cultural changes within a park's history, historical utilization of natural resources, and comparisons of park resources and threats (Figure 8).

Ala Kahakai National Historic Trail

Walking in the Ancestors' Footsteps
The arrival of Polynesians via ocean trails, around 1,500 years ago, resulted in large changes to the plants and animals on the west side of the island of Hawai'i: partial clearing of dry land vegetation (such as sandalwood and *loulu* palms), planting of crops such as coconuts and taro, and the introduction of pigs, dogs, and chickens. The development of the *ahupua'a* system of land use, however, meant that the island population lived for many centuries on the island's natural resources. Established in 2000 for the preservation, protection, and interpretation of traditional native Hawaiian culture and natural resources, the *Ala Kahakai National Historic Trail* is a 175-mile trail corridor full of this cultural and natural heritage.

Challenging Journeys
The early Polynesians were skilled ocean navigators who traveled long distances on double-hulled canoes capable of carrying colonists as well as all their supplies, domestic animals, and plants. Navigating by the stars, ocean swells, and bird flight patterns, they sailed eastward, crossing thousands of miles of ocean to colonize many Pacific islands in the area known today as the Polynesian Triangle.

Ocean Trails: the beginnings of change
The traditional Hawaiian land use system created six *moku* districts (right): Kona, Kohala, Hamakua, Hilo, Puna, and Ka'u.

Island Trails: connecting a kingdom
Historic land trails and water trails provided the means for people to trade and communicate.

Sacred Landscapes
A typical *ahupua'a*, or land division, was wedge-shaped and extended from *mauka* (the mountains) to *makai* (the sea). As water flowed from the upland forest, down through the *ahupua'a*, it passed from the *wao akua* (the realm of the gods) to the *wao kanaka* (the realm of man), where it sustained agriculture, aquaculture, and other human uses.

A Vision for Ala Kahakai National Historic Trail
Because much of the coastal trail remains under private ownership, the largest threat to its cultural and natural resources is rapid development (cattle ranching, hotels, houses, golf courses, marinas, light industry, and roads), bringing with it a multitude of invasive plant and animal species. Securing the *Ala Kahakai National Historic Trail* as land accessible to the public will provide an opportunity for future generations to learn about and preserve Hawai'i's unique cultural and natural resources.

Pacific Island Network Resource Brief
Inventory & Monitoring
National Park Service
U.S. Department of Interior

Water Quality Monitoring in the PACN

What Resource Is Monitored
Historical Park (WAPA)
Historical Park (KAHO)
Historical Park (KALA)
Historical Park (NPSA)
Historical Park (PUHO)
Historical Site (PUHE)
Historical Trail (ALKA)

Why Water Is Necessary For Life
Communities with water for drinking and recreation. Precipitation that chialine pools and streams, and in water is a requirement for healthy create and inhabit. Some threats to water cal, nutrient contamination, temperature inants make water unsafe for human and suitable habitat for aquatic organisms. nit the water's ability to support life.

How Water Quality is Monitored
Example of fixed and random water quality sampling sites in the Kipahulu area of HALE.
Water throughout the PACN is monitored in its many forms (streams, nearshore marine environments, estuaries, and brackish water pools).

Managed Landscapes
chemical water quality parameters
teral, state, and local water
ns
nce with relevant water quality regulations
water quality parameters
ent actions on water quality
ent on deteriorating water conditions

www.nps.gov/im/units/pacn/
www.nps.gov/im/units/pacn/monitoring/water_quality.cfm

2008

Figure 8. Outreach materials for Ala Kahakai National Historic Trail and water quality monitoring demonstrating diverse historical, cultural, and natural resources issues through multiple communication strategies (materials developed cooperatively with parks' staff and partners).

Given the diversity of PACN audiences (e.g., park managers and staff, school and university groups, conservation organizations, park visitors, and the public), the network will utilize a diverse set of tools as depicted in Tables 2 and 3. Refer to the appendices for more specific examples of the PACN products and tools. All of these products have either been produced or are on-going efforts.

Collaboration, Integration, and Outreach Strategies with Parks and Partners

Collaboration and integration of the I&M science communications program with ongoing parks' efforts, partner activities, as well as future endeavors is a challenging task. Most agency and partner staff are challenged for time and resources, yet collaborating on efforts can save considerable time and funding. The PACN has worked with some parks and partners to develop science communications tools as a framework for understanding resources. For example, in 2007 workshops were conducted with four West Hawai'i parks to develop posters and a newsletter that outline past and future conditions of resources in the parks with the University of Maryland, Center for Environmental Studies. The poster for Pu'ukoholā Heiau National Historic Site (Figure 9) depicts natural and cultural resource changes over time. It also provides basic conceptual diagrams, symbols, and text to be used as a foundation for future Vital Signs trends and assessment reports. While discussion about further integration with parks is ongoing, strategies are needed to identify how collaboration and integration will occur. This example addresses a park specific opportunity to convey a message, utilize media, and target audiences. Additionally, extensive partnership development is needed to leverage time and financial resources to effectively relay scientific results and narratives to broad audiences.

The I&M program currently works with PACN park units on communications and outreach projects, festivals, posters, fairs, and other activities. Through these interactive activities, both entities are tasked with the challenge of bringing communication messages about natural and cultural resources to diverse audiences, with I&M focusing on Vital Signs monitoring in the parks. Outreach events help to further integrate science communications efforts between the I&M program and parks. These messages are important for changing deleterious behavior to the parks' natural resources. Collaborative activities also increase resource efficiency, improve shared communication messages, and enhance delivery of these messages to parks management and the public.



Figure 9. Example of a collaborative science communications effort between a Pacific Island Network historic site, a university partner, and I&M.

Below is a brief summary of the network parks' current programs in science communications and interpretation, and potential areas of collaboration with I&M. The list in Table 2 is not exhaustive and serves as a suite of examples of science communications and outreach efforts undertaken in PACN park units.

Table 2. Opportunities to integrate Vital Signs monitoring results into existing park activities.

Science communication tools	Select park communications activities in parks	Integration of activity with Inventory and Monitoring
Site bulletins	Some parks have these available at visitor centers	Continue producing articles on natural resources, parks, and environmental issues; distribute at visitor centers and to interested groups through interpretation divisions
Movies/videos/presentations	Visitor center movies and "After Dark in the Park" presentations	Speak at 'After Dark' and other programs, and identify park uses for Vital Signs videos
Bookstores	Association-run bookstores	Produce resource briefs for park bookstores
Festivals and fairs	Most parks host or participate in fairs throughout the year	Establish rotating schedule of events where I&M participates with monitoring goals and products
Interpretive walks/hikes	Several parks have multiple interpretative walks lasting from 30 minutes to several hours	Include resource briefs for walk participants and facilitate use of monitoring stations on interpretive hikes
Visitor center displays and information	Most parks have a visitor center	Provide resource briefs, conceptual posters, display design and information, and Vital Signs videos for visitor centers
Jr. ranger/scientist programs	NPS-wide activity; not practiced at all parks	Develop Jr. Ranger monitoring kit
Environmental education programs for classrooms	Many parks establish classroom activities for various ages	Develop a unit on inventorying and/or monitoring for interpretive rangers
Websites	All parks have websites	Link parks to the PACN website to mutually enhance virtual experience and learning tools
Waysides	Most parks incorporate waysides	Contribute text and images to wayside exhibits about monitoring
Brochures	All parks have brochures	I&M brochures at parks' visitor centers
Species checklist and species cards	Some checklists exist	I&M provides information to parks for developing checklists and species cards
Interpretation focused training	Updates and trainings for Interpretation staff	Establish an I&M training schedule for interpreters
Virtual learning center	All parks present different degrees of natural resources information and education on the web	Collaborate with parks to develop an on-line learning center for research, education, and natural resources information in the PACN

Table 3. Pacific Island Network communication products and tools — * indicates priority.

Product or Tool	Description	Audience (primary / secondary)	Future Plans
Website (Internet)*	Public interface where all non-sensitive program and natural resource information is shared PACN Objective(s): 3	Public, other agencies and organizations, and academia	Website will serve as a clearinghouse for all publicly available non-sensitive data, updates, information, and communications for the network. Website is a keystone for the science communications program.
Website (Intranet)*	NPS interface for sensitive and intra-agency communications, and I&M data PACN Objective(s): 1,2,3,4,5	NPS staff	The intranet website will be updated and expanded as it is further developed.
Web-based Data, Status, and Trends “Drill Down” System*	Interactive web program using a conceptual diagram page with relevant monitoring protocols in each park. By clicking on the Vital Sign icons on the diagram users can ‘drill down’ to status and trends reports, or further ‘drill’ to synthesized data and information. PACN Objective(s): all	Park staff, other agencies, academia, conservation organizations, and the public	This project will be further conceptualized and developed depending on available resources. This system will become the principal mode for communicating monitoring protocol data, status, and trends.
Resource Briefs*	Identifies and describes monitoring protocols, status, and trends on one page handouts. PACN Objective(s): 1,3,4	Park staff, academia, conservation organizations, and park visitors	Two versions will be created for Vital Signs monitoring protocols. One version is a handout or poster for resource managers and academics. A simplified version is available for schools, festivals, and park visitor centers.

Table 3. Pacific Island Network communication products and tools — continued

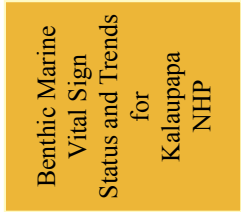



Product or Tool	Description	Audience (primary / secondary)	Future Plans
Status and Trends Reports and Condition Assessments*		Reports delivered to superintendents and natural resources staff based on park needs and protocol timetables PACN Objective(s): 1,2,5,6	Utilize a timetable for the delivery of these reports on a park-by-park, and/or protocol-by-protocol basis.
Newsletter*		Eight page quarterly update on PACN programmatic news, inventories, data management, monitoring updates, and current events and issues PACN Objective(s): 3,4,5	Fourteen issues of this publication were produced and distributed between 2005-2008. I&M will continue to produce this quarterly publication due to its effectiveness at disseminating PACN current events and information.
Brochure		Eight page booklet-style brochure describing the PACN I&M Program PACN Objective(s): 3	A new brochure reflecting Vital Signs monitoring trends will be produced between 2010 and 2012. An inventory specific brochure will also be produced during that timeframe.
Featured Parks		Identifies and describes a network park in a one page handout PACN Objective(s): 3,4,5	A section in the newsletter developed as a stand alone handout

Table 3. Pacific Island Network communication products and tools — continued



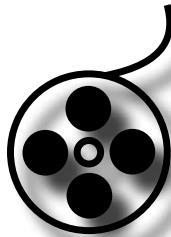
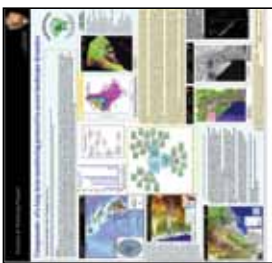
Product or Tool	Description	Audience (primary / secondary)	Future Plans
Featured Resources		Identifies and describes a resource in PACN parks; a one or two-page handout PACN Objective(s): 3,4,5	Park staff, academia, conservation organizations, and the public A section in the newsletter developed as a stand alone handout
Critical Issues		Identifies and describes an issue in PACN parks: a one or two-page handout PACN Objective(s): all	Park staff, academia, conservation organizations, and the public A section in the newsletter developed as a stand alone handout
Vital Signs Monitoring Protocols Audio / Video Presentations*		Short videos depicting each of the Vital Signs monitoring protocols available on the PACN internet website; plus limited public service announcements created for radio and television PACN Objective(s): 3,4,5	Film, edit, and develop videos and radio spots with outside partners to complete all Vital Signs audiovisuals. Air videos and radio spots at network visitor centers and other multimedia venues including schools, as podcasts, environmental education programs, and community service announcements.
Scientific Posters and Presentations*		Posters or presentations on specific PACN topics for scientific conferences, meetings, and parks PACN Objective(s): 3,6	Continue creating posters and presentations for conferences and park use.

Table 3. Pacific Island Network communication products and tools — continued

Product or Tool	Description	Audience (primary / secondary)	Future Plans
Species Cards and Checklists	 <p>Checklists and cards are used to identify species (e.g., native birds or invasive plants) PACN Objective(s): 3, 4</p>	Park visitors and staff	Work with park staff to identify needs for cards and checklists.
Park Conceptual Diagrams*	 <p>Park-specific poster depicting historical and current environmental processes influencing park resources PACN Objective(s): all</p>	Park visitors and staff	These products are completed for four PACN park units and will be developed at all others. They serve as a first step in developing a ‘drill-down’ system. The second step involves incorporating Vital Signs monitoring data into the conceptual diagrams to disseminate monitoring results.
Scientific Presentations	 <p>Power point presentations and lectures on the I&M program including monitoring status and trends PACN Objective(s): 3, 6</p>	Academia	Develop materials tailored to specific audiences.
Scholastic Presentations (K-12)	 <p>Environmental education activities for students PACN Objective(s): 3, 4, 5</p>	K-12 students	Engage teachers and local school groups to develop useful materials for school children.

Table 3. Pacific Island Network communication products and tools — continued

Product or Tool	Description	Audience (primary / secondary)	Future Plans
Festivals, Fairs, Public Events	 <p>PACN displays and interactive materials presented at events in Hawaii, Guam, Saipan, and American Samoa PACN Objective(s): 3, 4, 5, 6</p>	Park visitors, public	Provide PACN parks with I&M materials for park sponsored events.
Park Presentations	 <p>After Dark in the Park and GIS presentations at parks' visitor centers PACN Objective(s): 3, 4, 5</p>	Park visitors	Continue to participate in park educational events.
Science Days	 <p>Park or region-wide symposia on inventories and Vital Signs monitoring results PACN Objective(s): 1, 2, 3</p>	Park staff, academia	Arrange symposia at network parks and invite scientists to make presentations.
Virtual Learning Center*	 <p>Website where research results, information, and education on natural and cultural resources is consolidated and shared among all network parks PACN Objective(s): all</p>	Researchers, academia, park staff, public	Develop a network of partners within and among all network parks to encourage full park participation in the use, upkeep, and content of the virtual learning center. Use website to host “drill-down” system (described on page 22).

Science Communications' Role in Adaptive Management

Adaptive management principles and applications are evolving and continue to gain relevance to managers of natural resources. Adaptive management requires a cyclical feedback loop, wherein management trajectories are changed based on new information from the field (i.e., inventories, monitoring, and research). A well-functioning adaptive management loop requires not only research and monitoring data, but also adequate synthesis and communication of these data. Hence, field research and monitoring, data synthesis, effective science communications, and decision-support systems are all required components of adaptive management (Thomas et al. 2006). For example, if Vital Signs monitoring on coral reefs demonstrates decreasing coral recruitment in heavily used areas, then management decisions can include the reduction of visitors to the reefs. This could be followed by an interpretive message on appropriate visitor behavior on the reef.

The I&M program plays a key role in three components of this adaptive management cycle: (1) data collection and analyses, (2) communicating synthesized results to managers (which includes decision support), (3) collaboration on interpretive messages. The following diagram depicts the key steps in this process (Figure 10).

Science Communications Component of Adaptive Management for I&M

Planning

Monitoring

Evaluation

Communications for Understanding

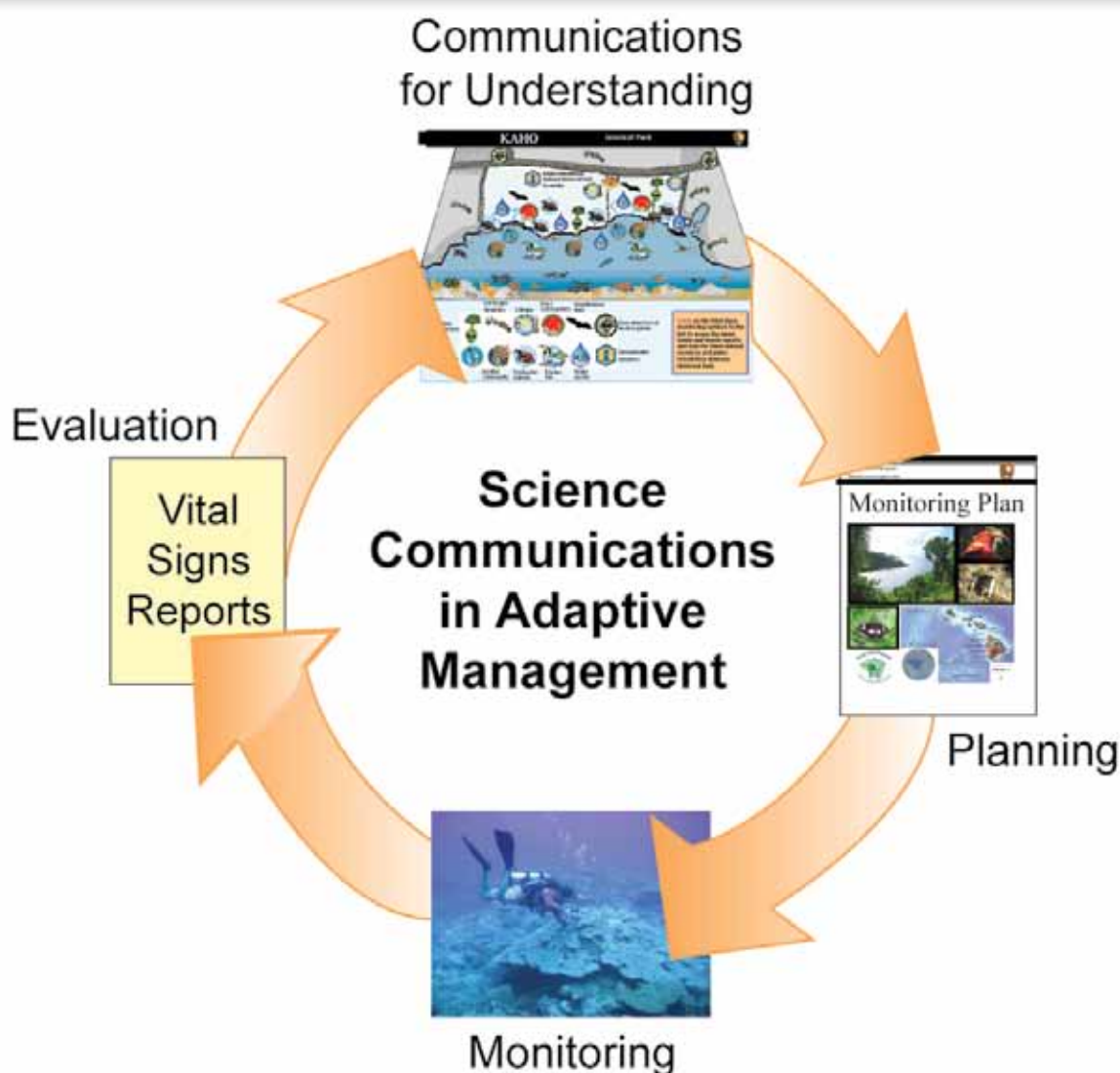


Figure 10. Science communications facilitates adaptive management by linking science and planning.

Personnel for Science Communications

Increasing levels of scientific information will require continued development of media that can reach diverse audiences. The time and staff needed to develop the diverse array of communication products will grow as monitoring programs grow and results become available. This will require a corresponding commitment of time and staff. Likewise, the development of condition assessments and report cards for Vital Signs will require science communications staff and ecologists to synthesize information. The traditional PACN staffing model for science communications has consisted of staff with collateral duties who also have science communications responsibilities. However, if this model is continued as science communications needs increase substantially, the network science communications output will progress at a slower pace than if dedicated staff are hired. The optimal plan for science communications staffing is below, recognizing that as Vital Sign protocols are implemented and needs for future monitoring synthesis and communications of results increase, additional staff are needed:

- | | |
|---|-----------------------|
| 1. Science Communications Lead/Coordinator 0.25 FTE | 4. Volunteers |
| 2. Communications technical staff 1.0 FTE | 5. Parks partnerships |
| 3. Internship program (recruit university students) | |

Looking Ahead

Vital Signs Trends Reports and Condition Assessments

The development of Vital Signs status and trends reports for park decision makers is the I&M program's priority task. Along with Vital Signs trends reports, the PACN will create condition assessments, and this information will be delivered to the parks through diverse mechanisms.

Synthesized and summarized data collected on a regular basis will be distributed to each park's natural resources managers and superintendents in the form of status and trends reports. Two versions of the trends report will be available, including a complete scientific version and a short summary in a readily understandable format for non-scientists (electronic and hardcopy). The status and trends reports will be dynamic, utilizing a combination of text, conceptual diagrams, maps, data, graphs, tables, and photos.

Condition assessments are used to determine the overall condition of resources in parks. They provide a snapshot-in-time of condition status, critical data gaps, and resource condition influences. As an example, geospatial analyses enhance the utility of project findings in planning and decision making, assisting parks to report on performance goals. Assessments are produced from existing data. The sources of data can include governmental and non-governmental organizations. Condition assessments strive to provide a holistic, science-based evaluation of overall condition by park or geographic unit (e.g., watersheds). Assessments help park managers describe and quantify characteristics of desired conditions. To report on resource conditions to politicians and the public, report cards are being utilized by various agencies. The NPS uses natural resource summary tables which will be used nationally to connect science with elements of park planning in a framework called 'connect the dots.' However, several agencies including NPS are grappling with requisite thresholds and management triggers for condition assessments. Challenges with establishing thresholds highlight needs for monitoring data which feeds into adaptive management with streamlined decision support systems.

In order to develop park assessment products, several processes must be utilized as described in Figure 11. A key component includes establishing a threshold or trigger point from which healthy ecosystem standards are breached and management action may be necessary.

Figure 11. Four basic steps in creating condition assessments. The resulting integrated assessment provides a quick and comparative reference to the status and trends of Vital Signs health for a park unit.

1

“Thresholds” or assessment points are established. These values are directly linked to management objectives for parks or park units, and are often expressed as “desired future conditions”.

2






The Vital Sign monitoring data are compared to the thresholds. This step determines whether specific resource parameters (e.g., marine fish numbers) fall below or exceed desired conditions.

3

Apply the integrated assessment to calculate the overall Vital Sign condition in a park or unit (e.g., use an average of individual Vital Sign category conditions).

4

Summarize the integrated assessment through visual and graphic displays in a condition assessment format (below).

Vital Signs Status and Trends Condition Assessment for Park X			(Supporting Table)		
Vital Sign	Measure	Current Condition	Data Sources	Reference Condition	Comments
	rainfall	Good	4	Good	Stable
	Density	Fair	2	Good	Improving
	Abundance	Poor	5	Fair	Threat
	Abundance	Poor	1	Poor	Threat
	Density	Fair	3	Good	Improving



Drill-down System for Accessing I&M Data on the Web

In addition to Vital Signs trends reports and condition assessments, a park-specific internet/intranet format where current monitoring information can be easily accessed by managers, scientists, and the public will be developed. To provide for mutual understanding and use, status and trends information will be broadly summarized on a map of each PACN park. The map will contain links to Vital Signs monitoring results. The interface user will “drill down” on hot-spots, represented by Vital Signs symbols, and navigate from general trends reports to condition assessments, and ultimately to field data. The user can also navigate to Vital Signs video links, resource briefs, and other information (Figures 12 and 13 [alternate example]). The “drill-down” system represents the future of Vital Signs monitoring information dissemination on the web because it caters to the needs of many audiences and is easily maintained and updated. Potentially sensitive data will not be publicly available.



Figure 12. Example of plans for web-based Vital Signs status and trends drill-down system.

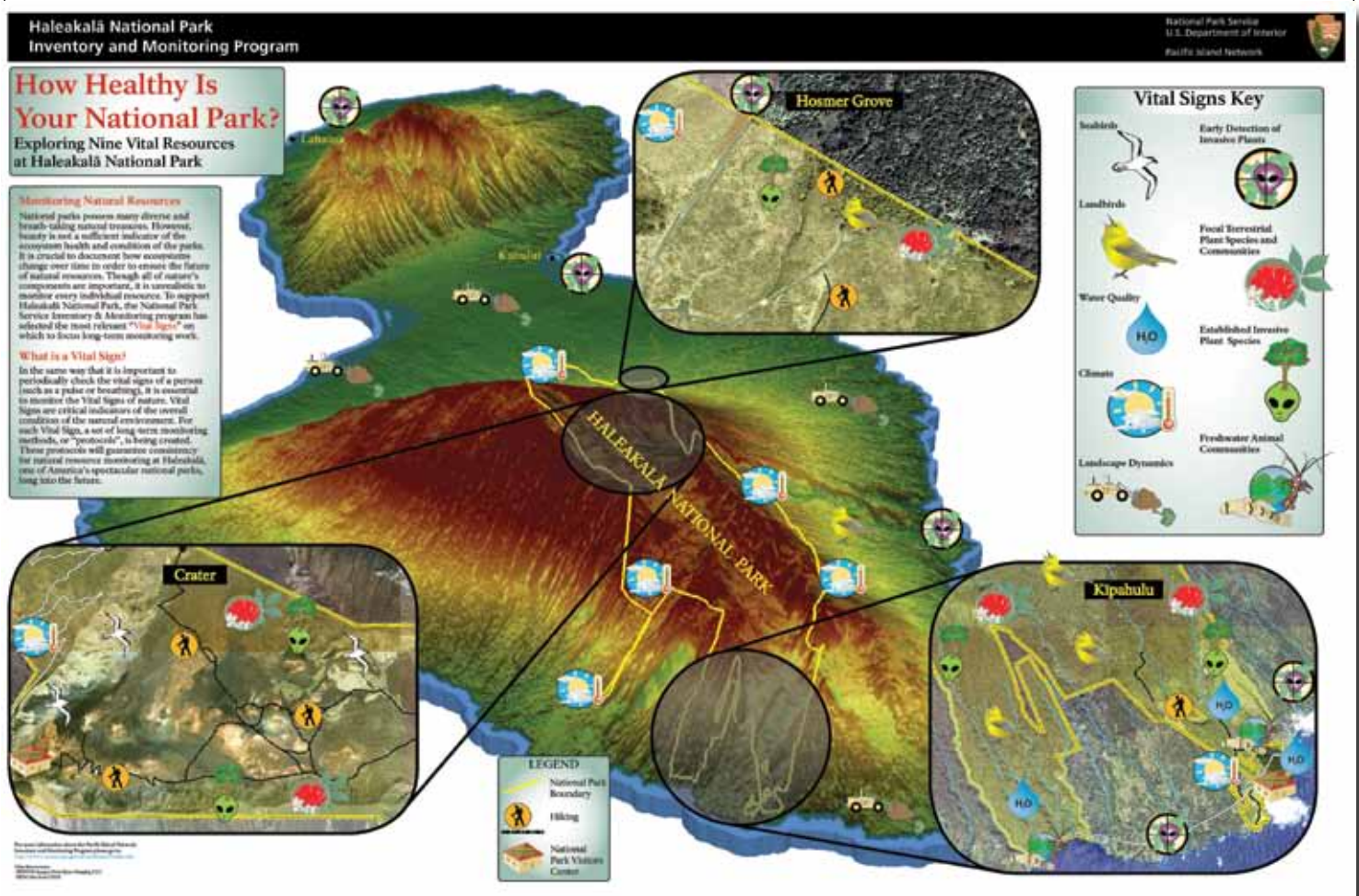


Figure 13. Alternate example of web-based Vital Signs drill-down system incorporating Interpretation outreach.

Parks Needs Assessment

I&M will create a definitive strategy to identify prospects for collaboration and teamwork through scoping meetings with park staff. The initial scoping with the parks will develop a mutual understanding of constraints within which the I&M program operates. The PACN will then summarize results for review by parks. These scoping materials will be used as a template for a needs assessment workshop with the parks that identifies a common vision and science communications tools and products that parks and I&M can develop cooperatively. The network will also identify specific strategies to work with Interpretation such as incorporating trail information with Vital Signs monitoring data (Figure 13).

Virtual Learning Center

The PACN plans to initiate a virtual learning center which represents a Pacific island region-wide resources information website focusing on national park units. The dissemination of science through a virtual learning center provides an efficient, effective venue to reach a wide audience, ranging from park superintendents to scientists, educators, and the public. Once developed, the ease of updating information will ensure that the most current data are available. Designed to act as a compliment to park websites, the virtual learning center assumes a resource-centric, rather than a park-centric approach to information organization and communication. However, resources information should be accessible by park unit as the "drill down" system may be hosted within the virtual learning center website. The virtual learning center should be maintained by a strong partnership between parks, I&M, and park related partners.

Evaluation of Science Communications in PACN

A valuable and often overlooked component of any program is an evaluation method for effectiveness of communications. The I&M program's science communications component needs a strategic long-term plan with dedicated staff, as well as systematic evaluation of the products already disseminated. The science communications plan provides future direction, but a method of systematic evaluation must also be established. If I&M is not effectively relaying scientific results and data synthesis to the target audiences, then strategies and methods must be re-evaluated. A variety of strategies are available for program evaluation, but the most effective is a combination of approaches including evaluation questionnaires distributed to selected parks staff, and in-person moderated meetings to evaluate the effectiveness of message delivery and products. The frequency of these evaluation strategies must be determined in the future, but is planned within the first two years of the implementation of the science communications plan. Criteria for evaluation will be determined after further outreach products have been delivered.

Landmarks

The following is a timeline for science communications in the PACN. Figure 14 is a schedule of selected past and anticipated science communications and outreach programs and products. The I&M program began outreach efforts when first initiated in park units in 2001 (see Table 3 for details). Science communications landmarks begin in 2005 with the first Pacific Island Network Quarterly newsletter. The green boxes of the graphic in Figure 14 are science communications efforts specifically designed for the delivery of Vital Signs monitoring information, status, and trends to park natural resources managers and superintendents. The yellow boxes are products and services created to convey I&M related materials to other park staff, scientists, academics, and the public. For continuity, once a product or project is mentioned, it can be assumed that the product/project continues into the future. These products are implemented throughout the parks each year.

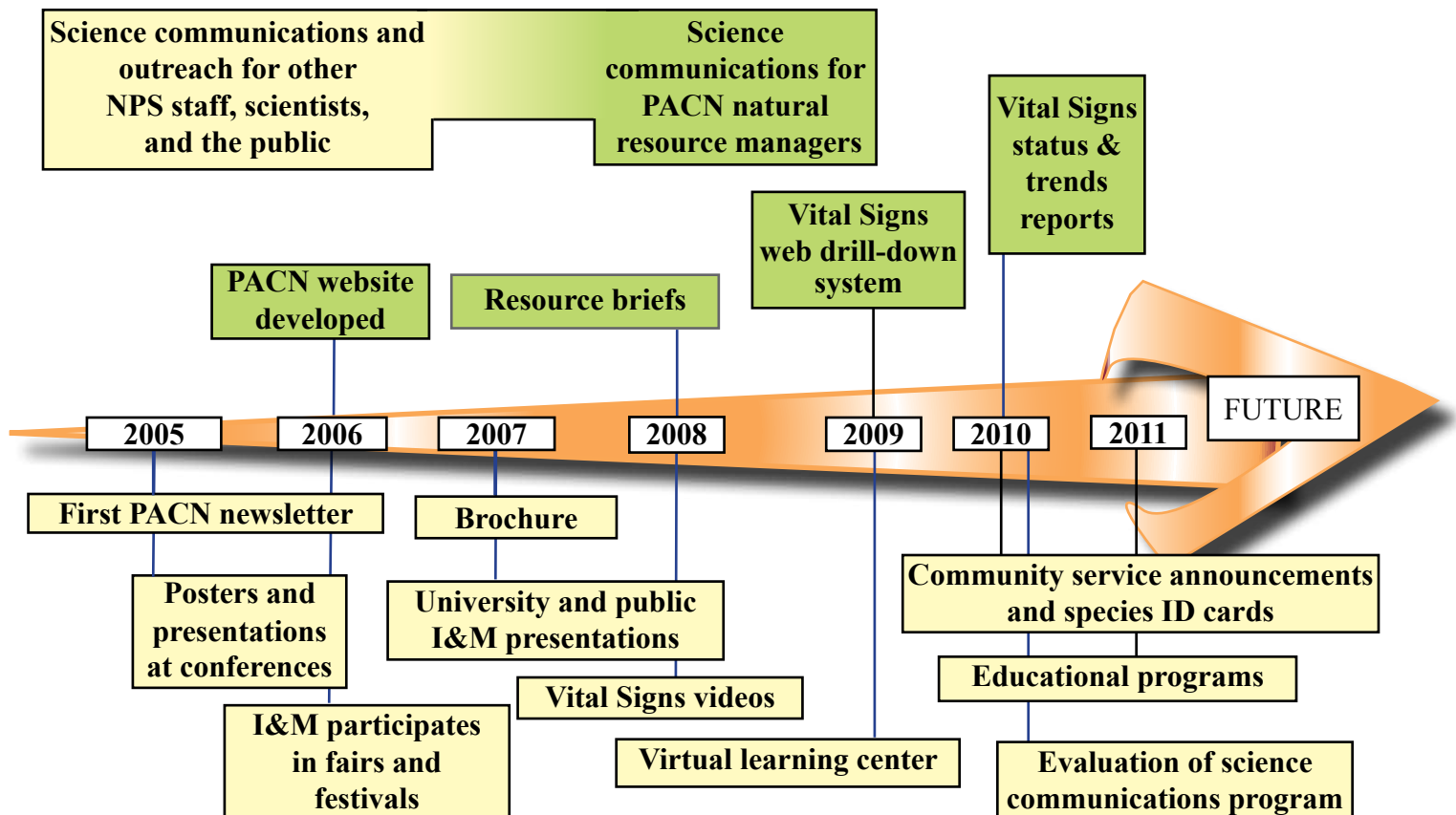


Figure 14. Science communications landmarks.

Science Communications and the Future of the PACN

This science communications plan provides a foundation for strategies and products that comprise ongoing and planned science communications in the Pacific Island Network. The network will produce reports, posters, newsletters, websites, videos, and numerous other products that target the key audiences of park managers, outside organizations, and the public. The Pacific Island Network intends to utilize state-of-the-art strategies to clearly and effectively communicate with stakeholders and to work in close collaboration with network parks. Only through the combined efforts of the I&M program, the parks, and cooperating agencies will the goal and objectives of this plan be achieved. Many science-oriented organizations purport a mind-set that the job is complete after the data are collected, analyzed, and transformed into reports or publications. However, science only becomes meaningful when it has been synthesized and presented in a format which can be understood by all stakeholders through appropriate communication tools. Only then will scientific monitoring results be broadly understood. When effective science communications is achieved, the relevance of monitoring in the Pacific Island Network will become meaningful and real to everyone associated with the national parks.

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Appendixes A–N (Examples of Available Products)



The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS D-52, April 2009

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